

### **REMARKS**

Claims 1, 4-8, 10-14, 16-23 and 26 are pending in this application. Claims 1 and 8 are written in independent form. By this Amendment, claims 2, 3, 9, 15, 24 and 25 are cancelled without prejudice or disclaimer. Claims 1, 4, 8, 11-14 and 22 are amended. No new matter is added.

### **Interview**

An interview was conducted on January 8, 2009 between Applicants' representative and Examiners Desai and Le. During the interview, the subject matter of the rejected claims and the combinability of the primary reference of Heine and the secondary reference of Garis were discussed. Proposed claim amendments were also presented by Applicants' representative, such as amending independent claim 1 to include the subject matter of dependent claims 2 and 3 and rewriting dependent claim 8 in independent form, inclusive of the subject matter of claims 2 and 3.

The Examiners maintained their position regarding the propriety of combining the applied references but did concede that the applied references did not fairly disclose a redundant cooling device and suggested amending the claims to highlight the redundancies of the parts contained in the cooling device. As the claims are so amended, Applicants note that the amended claims distinguish over the applied references of record.

### **Drawing Objection**

The drawings are objected to for allegedly failing to show every feature recited in the claims. Specifically, it is alleged that claim 1 recites "coolant flowing through a stator cooling ring of the electric submarine drive motor" and that such a feature is not shown in the drawings.

As claim 1 does not include such a recitation, there is no requirement for the drawings to be amended to show the feature. Accordingly, withdrawal of the objection is respectfully requested.

### **Rejections under 35 U.S.C. §103**

Claims 1, 2, 4, 10, 11, 19 26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over "Four-Circuit DC Motor For Submarine Propulsion" by Heine, et al. (Heine) in view of U.S. Patent No. 4,313,309 to Lehman and further in view of U.S. Patent 5,078,628 to

Garis. Claims 3, 5, 15, 24 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine, Garis and Lehman and further in view of U.S. Patent No. 3,089,969 to Wiedemann. The rejections are respectfully traversed. As independent claim 1 is amended to include the subject matter of cancelled claims 2 and 3, the rejections of those claims is traversed together.

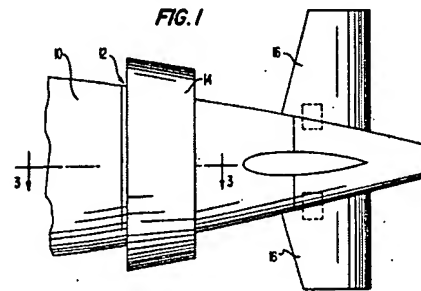
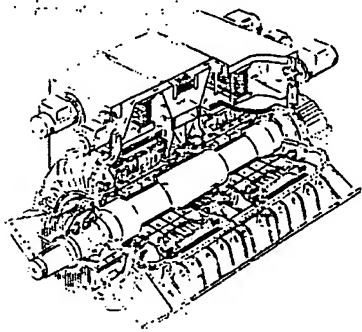
Heine relates to a four-circuit DC motor mounted on board a submarine that is cooled by circulating air around the windings and the commutator of the motor. The flow of the cooling air is illustrated in Fig. 9 of Heine which shows a fan for moving the air around the commutator and a fan for moving air around the winding, respectively. Thus, as admitted in the Office Action, Heine clearly fails to disclose or suggest a first and a second liquid cooling circuit adapted to flow a liquid coolant in a counter-current through a stator cooling ring of the submarine motor, as recited in independent claim 1.

In an effort to overcome the admitted deficiencies, it is alleged that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Heine with the teachings of Garis.

Garis relates to a marine propulsor for submersible vessels or surface vessels powered by underwater propulsion units. In Garis, a shaftless motor with disk-shaped rotor and stator(s) is mounted in the vessel structure with a blade hub mounted on the rotor, the hub including propeller blades extending beyond the circumference of the vessel housing. A water cooling/lubricating system is provided for the bearings and rotor/stator(s). The rotor 30 and stators 26, 28 are located outside of a body 10 in the blade shroud 14 and are cooled by the surrounding water (see Figs. 1 and 2). The rotor and stator operate in water and at submergent water pressure. Figure 3 of Garis shows tertiary passages 56 passing through the rotor 30 and passages 56 passing through stators 26 and 28. Cooling water can be pumped through the rotor and/or stators through fluid conduits 52. Inlet 58 feeds a cooling water passage 60 that extends through a shroud 14, a pre-swirl strut 18a and a post swirl strut 18b. The cooling passage 60 extends through limbers or passages 66 that supply water to the tertiary passages 56.

It is alleged in the Office Action that one of skill in the art, at the time of the invention, would have modified the air cooled submarine motor of Heine (below left) to include the teachings of Garis. However, there is no motivation or suggestion to do so. The submersible motor (propulsor) of Garis (below right) does not correspond to an electric submarine drive motor. For example, the propulsor of Garis is located outside of the body 10 of the vehicle and

is submerged in water. In contrast, the electric drive motor of Heine must be mounted within the body of a submarine to operate. Thus, the cooling systems of the electric submarine motor of Heine, which circulates cooling air around the motor, and the cooling system of the propulsor of Garis, which pumps water through passages in the submerged rotor and stator, are so different as to be uncombinable.



Moreover, modifying the air cooled submarine motor of Heine with the teachings of Garis (i.e., flowing water through the submerged propulsor) would render the submarine motor of Heine useless for its intended purpose by short circuiting the motor. Further, re-designing the air-cooled motor of Heine to a water cooled system would require steps not taught or suggested by either of the references. Therefore, the combination of references fails to render the rejected claims obvious because the suggested combination of references would require substantial redesign and reconstruction of the elements shown in the primary reference of Heine, as well as a change in the basic operating principle under which Heine was designed to operate (see MPEP §2143.01(VI) citing *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)).

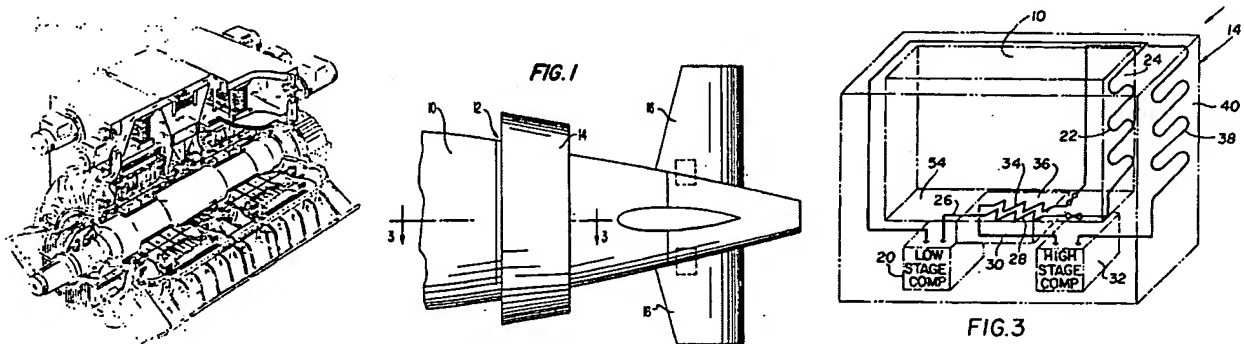
In addition to the above deficiencies, the combination of references also fails to disclose or suggest a main pump and a minor pump, the minor pump being a lower power pump than the main pump, are arranged in each cooling circuit. In an effort to overcome this admitted deficiency, it is alleged that one it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the air-cooled submarine motor of Heine according to the teachings of Lehman.

Lehman relates to a two-stage refrigerator used for storing medicine which has a high stage compressor 32 and low stage compressor 20. To obtain very low temperatures in the freezer compartment 10, two separate refrigeration systems are utilized, namely a so-called "high stage" and a "low stage." Both stages, as is well understood, provide refrigerant compression and

evaporation phase changes in order to produce a refrigerating effect. The high stage refrigeration system produces these refrigerant phase changes at comparatively high temperatures, whereas the low stage refrigeration system provides these phase changes at considerably lower temperatures. More particularly, it is the low stage refrigeration system which is effective in causing an evaporation phase change in the refrigerant at significantly low temperature, which is primarily responsible for the corresponding low temperature produced by this refrigerant in the freezer compartment 10.

As illustrated in FIG. 2 of Lehman a control unit 52, which is operated by the temperature-sensitive probe 48, is electrically connected to the conductor 44 of the compressors 20 and 32 for both of the two refrigeration systems involved. Thus, when the probe 48 indicates a low enough operating temperature within compartment 10 so that operation of the low stage compressor 20 can be dispensed with, operation of the high stage compressor 32 will be temporarily discontinued. When the operation of the high stage compressor 32 is thus terminated this, of course, eliminates the condenser coils 38 as a source of heat, and thus effectively obviates the adverse consequences.

Thus, there is no motivation or suggestion to combine the teachings of a two-stage refrigerator (below right) with the air-cooled submarine engine of Heine (below left) and the propulsor of Garis (below center). Moreover, one of skill in the art would not modify the air cooling system of the electric submarine motor of Heine to include the compressors of Lehman because the refrigerant compressors of Lehman would not operate to move the cooling air of Heine.



Further, although it is alleged in the Office Action that it would have been obvious to one of skill in the art to modify Heine as disclosed in Garis and Lehman, there is no disclosure or

suggestion in any of the references to do so. A statement that modifications of the prior art to meet the claimed invention would have been within the skill of one of the art at the time of the invention is not sufficient to establish *prima facie* obviousness without some objective reason to do so (MPEP §2143.01). In the present case, the Examiner is using impermissible hindsight to reconstruct the elements of the claims. There is no objective reasons one of skill in the art would seek to combine the elements of the disparate references and to do so would require such innovation as to be inventive.

Further, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants disclosure (MPEP §2143). In making an assessment of the differences between the prior art and the claimed subject matter, 35 USC §103 specifically requires consideration of the claimed invention “as a whole.” The “as a whole” instruction in 35 USC §103 prevents evaluation of the invention on a part-by-part basis. Without this important requirement, an obviousness assessment might break an invention into its component parts, then find a prior art reference corresponding to each component. This line of reasoning improperly imports hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components (*Ruiz v. A.B. Chance Co.*, 357, F.3d 1270, 1275, (Fed. Cir. 2004)).

By combining Lehman which does not relate to a redundant cooling device for an electric liquid-cooled submarine drive motor, the Examiner is merely breaking the invention into component parts and seeking to find the parts in the prior art, thus, employing hindsight into the determination of obviousness.

In addition to the above deficiencies, the combination of references also fails to disclose or suggest the main pump and the minor pump of each cooling circuit include supply voltages that are independent of each other. In an effort to overcome this admitted deficiency, it is alleged that one it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the air-cooled submarine motor of Heine according to the teachings of Wiedemannn.

Wiedemannn relates to cooling a turbogenerator. The generator includes two motors M, M' used for powering a blower 2 and a pump 16, respectively. Wiedemann fails to disclose or suggest a main pump and the minor pump of each cooling circuit include supply voltages that are independent of each other. In fact, Wiedemannn only discloses a single pump 16 and does not

disclose supply voltages that are independent of each other. Although Wiedemann fails to disclose the claimed subject matter, it is alleged in the Office Action that “it is well known to those skilled in the art for motors driving separate circuits to have independent supply voltages.”

Applicants respectfully remind the Examiner that it is never appropriate to rely on common knowledge in the art without evidentiary support in the record, as the principal evidence upon which a rejection is based. See MPEP §2144.03 citing *In re Zurko*, 258 F.3d 1379, 1385, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001).

In combining Weidemann, the Examiner continues the improper use of hindsight reconstruction by failing to consider the invention as a whole, but rather, breaking down the invention into component parts and attempting to find a prior art reference corresponding to each part (*Ruiz v. A.B. Chance Co.*, 357, F.3d 1270, 1275, (Fed. Cir. 2004)).

As Wiedemann fails to disclose or suggest the features as alleged in the Office Action, the combination of references fails to render the rejected claims obvious.

Regarding claims 4 and 5, it is alleged that the claims are obvious because Lehman discloses that the compressors 20 and 32 “can be turned on and off.” Applicants fail to understand the relevance of this reason for rejecting claims 4 and 5 which recite for example, that “each cooling circuit is operable in a low speed range of the electric submarine drive motor, exclusively by the use of the minor pump assigned thereto.” As turning a refrigerator compressor on and off has no relevance to an operating speed of a submarine drive motor Lehman fails to disclose or suggest the additional features of claims 4 and 5.

Claims 12-14, 16 and 22 stand rejected under 35 U.S.C. 35 U.S.C. §103(a) as being unpatentable over Heine, Garis and Lehman in view of U.S. Patent No. 5,196,746 (“McCabria”). The rejection is respectfully traversed.

Claims 12-14, 16 and 22 are allowable for their dependency on their base claim for the reasons discussed above, as well as for the additional features recited therein. Moreover, McCabria, relates to cooling and lubrication systems for aircraft generators. Thus, McCabria fails to relate in any way or disclose or suggest an electric submarine drive motor as recited in the rejected claims. Further, one of ordinary skill in the art would not seek to modify the submarine engine cooling system of Heine with the generator cooling and lubrication system for

an aircraft generator of McCabria as there is no suggestion or motivation to do so in either of the references or in the general knowledge of those of skill in the art.

Claims 6, 8 and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Garis in view of U.S. Patent No. 6,901,765 (“Amaral et al.”); claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine, Garis and Amaral in view of Lehman; claims 9 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Garis in view of U.S. Patent No. 6,596,175 (“Rowe”); claim 18 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Garis in view of U.S. Patent 4,766,557 to Twerdochlib; claim 20 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine, Garis and Lehman in view of Twerdochlib and claim 23 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Garis in view of U.S. Patent No. 4,916,341 (“Mantovani”). The rejections are respectfully traversed.

Claims 6, 7, 17, 18, 20, 21 and 23 are allowable for their dependency on their independent base claim for the reasons discussed above, as well as for the additional features recited therein.

In rejecting claim 20, it is alleged in the Office Action that it would have been obvious to one of ordinary skill in the art to further combine the teachings of Twerdochlib with Heine and Lehman. The applied reference of Twerdochlib relates to an apparatus which can detect a cracked stator coil, or other portion of a stator coil water cooling system used in electric generators that are driven by steam turbines. Thus, the additional reference of Twerdochlib fails to disclose or suggest an electric submarine drive motor. Moreover, one of skill in the art would not look to the teachings of Twerdochlib to modify Heine as the references relate to disparate art and seek to resolve different problems.

Regarding the rejection of claim 8, now written in independent form and to include the features of claim 9, it is alleged in the Office Action that it would have been obvious to one of skill in the art at the time of the invention to further modify the air cooled submarine engine of Heine with the teachings of Amaral.

Amaral relates to a temperature regulation apparatus for a motor vehicle, such as an air conditioner in a car. Thus, Amaral fails to disclose or suggest an electric submarine drive motor.

Moreover, there is no motivation or suggestion to modify the electric submarine drive motor of Heine with the teachings of the car air conditioner described in Amaral.

It is admitted in the Office Action that Amaral fails to disclose the claimed arrangement of parts on the upper part of the electric submarine drive motor. Despite this deficiency, it is alleged that it would have been obvious to one of skill in the art to “rearrange” the parts of the cooling circuit as rearrangement involves only routine skill in the art.

However, a feature can be considered obvious design choice only in cases where a rearrangement of parts that does not modify operation of the device is suggested by the prior art (MPEP §2144.04). There can be no rearrangement of parts in this case because the combination of references does not disclose or suggest the features of the rejected claims, as admitted in the Office Action. Further, the prior art must provide the motivation, without the benefit of Applicants’ specification, to make the necessary changes in the reference device (MPEP §2144.04(f)). Finally, rearranging the parts of the car air conditioner as described in the rejected claims would certainly modify the operation of the device. Thus, there is no motivation or suggestion to combine the references as proposed.

In addition to the above deficiencies, the combination of references also fails to disclose or suggest the two cooling circuits each have a cooling branch, by which inverter modules assigned to the submarine drive motor are coolable. In an effort to overcome this admitted deficiency, it is alleged that one it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the air-cooled submarine motor of Heine according to the teachings of Rowe.

Rowe, relates to liquid cooling systems for large industrial electric power generators that have liquid cooled stators. As such, Rowe fails to disclose or suggest an electric submarine drive motor. Also, there is no suggestion or motivation to modify Heine with a stator cooling system for an industrial electrical power generator.

In combining the teachings of the car air conditioner of Amaral and the teachings of the industrial generator of Rowe with Heine, the Examiner continues the improper use of hindsight reconstruction by failing to consider the invention as a whole, but rather, breaking down the



invention into component parts and attempting to find a prior art reference corresponding to each part (*Ruiz v. A.B. Chance Co.*, 357, F.3d 1270, 1275, (Fed. Cir. 2004)).

Regarding claim 23, Mantovani, used to reject claim 23 in combination with Heine, relates to an electric arbor that is integrated with an induction motor for high performance uses. As such, Mantovani fails to disclose or suggest a submarine electric drive motor. Moreover, there is no suggestion or motivation to combine the references as suggested in the Office Action.

Applicants respectfully remind the Examiner that marine and/or naval vehicles are subject to very specific safety requirements and, therefore, have a design that fundamentally differs from that of fixed installations on land. As such, the application of such references in rejected the present claims is inappropriate when examining the present claims. As none of the applied references disclose or suggest the features recited in the rejected claims, withdrawal of the rejections is respectfully requested.

### **CONCLUSION**

In view of the above remarks and amendments, Applicants respectfully submit that each of the rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

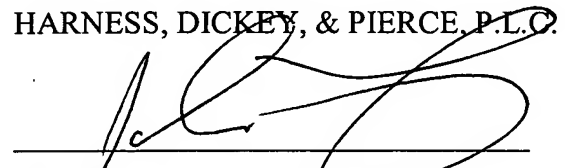
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Fitzpatrick at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By



John W. Fitzpatrick, Reg. No. 41,018

P.O. Box 8910  
Reston, Virginia 20195  
(703) 668-8000

DJD/JWF/kas